PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of

Antoine MOULIN

Appln. No.: 10/544,206

Confirmation No.: 8480

Filed: March 10, 2006

Docket No: Q89340

Group Art Unit: 1793

Examiner: Weiping Zhu

For: METHOD OF PRODUCING A COLD-ROLLED BAND OF DUAL-PHASE STEEL WITH A FERRITIC/MARTENSITIC STRUCTURE AND BAND THUS OBTAINED

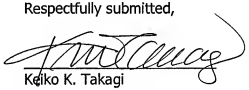
SUBMISSION OF APPEAL BRIEF

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Submitted herewith please find an Appeal Brief. The USPTO is directed and authorized to charge the statutory fee of $540.00 and all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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APPEAL BRIEF UNDER 37 C.F.R. § 41.37

MAIL STOP APPEAL BRIEF - PATENTS
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Alexandria, VA 22313-1450

Sir:

In accordance with the provisions of 37 C.F.R. § 41.37, Appellant submits the following:

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I. REAL PARTY IN INTEREST

The real party in interest is USINOR.

II. RELATED APPEALS AND INTERFERENCES

Appellants, Appellants' legal representative and the Assignee of this application are not aware of any other appeals or interferences that will directly affect, or be affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-22 are pending in the application.

Claims 1-12 are rejected.

Claims 13-22 are withdrawn from consideration.

This is an appeal from the Examiner's rejection of claims 1-12 under 35 U.S.C. § 103(a).

IV. STATUS OF AMENDMENTS

The Amendment under 37 C.F.R. § 1.111 submitted on December 10, 2007, is the last response submitted with amendments to the claims of the application. The Amendment filed on December 10, 2007 was entered via the filing of a Request for Continued Examination filed on January 9, 2008.

There are no outstanding amendments to the claims or to the specification in the present application.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

Independent claim 1 recites a process for producing a cold-rolled ferritic/martensitic dual-phase steel strip, wherein a slab, the chemical composition of which comprises, by weight:

$0.010\% \leq C \leq 100\%$

$0.050\% \leq Mn \leq 1.0\%$

$0.010\% \leq Cr \leq 1.0\%$

$0.010\% \leq Si \leq 0.50\%$

$0.001\% \leq P \leq 0.20\%$

$0.010\% \leq Al \leq 0.10\%$

$N \leq 0.010\%$

the balance being iron and impurities resulting from the smelting, is hot rolled (*see* page 2, lines 19-32). The process then comprises:

- coiling the hot-rolled strip obtained at a temperature of between 550 and 850°C (*see* page 2, lines 34-35); then
- cold rolling the strip with a reduction ratio of between 60 and 90% (*see* page 2, lines 36-37); then
- annealing the strip continuously in the intercritical range (*see* page 2, lines 38-39); and
- cooling it down to the ambient temperature in one or more steps, the cooling rate between 600°C and the ambient temperature being between 100°C/s and 1500°C/s (*see* page 3, lines 1-4); and

- optionally tempering it at a temperature less than 250°C (*see* page 3, lines 5-6 and page 6, lines 38-39),

the annealing and cooling operations being carried out in such a way that the strip finally contains from 1 to 15% martensite (*see* page 3, lines 7-9).

Claims 2-12 depend from claim 1.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issue on appeal is whether the Examiner improperly finally rejected claims 1-12 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Nakaoka et al. (US 4,336,080) in view of Chatfield et al. (US 4,149,218).

VII. ARGUMENT

The rejection of claims 1-12 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Nakaoka in view of Chatfield should be reversed because there is no suggestion or motivation to combine or modify Nakaoka based on Chatfield to arrive at the claimed invention.

A *prima facie* showing of obviousness requires (1) a suggestion or motivation in the references or in the knowledge of one of ordinary skill in the art, to modify the references or to combine reference teachings; (2) a reasonable expectation of success; and (3) a teaching or suggestion of all claimed limitations.

Claim 1 recites a process for producing a cold-rolled ferritic/martensitic dual-phase steel strip, wherein a slab, the chemical composition of which comprises, by weight:

$$0.010\% \leq C \leq 0.100\%$$
$$0.050\% \leq Mn \leq 1.0\%$$
$$0.010\% \leq Cr \leq 1.0\%$$
$$0.010\% \leq Si \leq 0.50\%$$
$$0.001\% \leq P \leq 0.20\%$$
$$0.010\% \leq Al \leq 0.10\%$$
$$N \leq 0.010\%$$

the balance being iron and impurities resulting from the smelting, is hot rolled, said process then comprising the steps consisting in: coiling the hot-rolled strip obtained at a temperature of between 550 and 850° C; then cold rolling the strip with a reduction ratio of between 60 and 90%; then annealing the strip continuously in the intercritical range; and cooling it down to the ambient temperature in one or more steps, the cooling rate between 600°C and the ambient temperature being between 100°C/s and 1500°C/s; and optionally tempering it at a

temperature below 250°C, the annealing and cooling operations being carried out in such a way that the strip finally contains from 1 to 15% martensite.

Nakaoka discloses a manufacturing process of cold-rolled steel bands presenting a good workability. The process of Nakaoka is applied to a steel composition that is different from the claimed composition. Indeed, as recognized by the Examiner, the composition of Nakaoka does not contain chromium, whereas the claimed composition contains chromium in an amount of at least 0.01%. Chromium is not an impurity in the claimed invention, despite its low amount, and is an added element required to obtain the desired martensite percentage in the steel band microstructure.

In addition, the steel of Nakaoka is not martensite. The process disclosed in Nakaoka requires step of overaging, which has a metallurgical effect to turn the eventual martensite into ferrite. Martensite is very hard and can be destroyed by the application of heat because of its metastable phase. That is, martensite is the kinetic product of rapid cooling of steel containing sufficient carbon. Since chemical process (the attainment of equilibrium) accelerate at higher temperature, martensite is easily destroyed by the application of heat. The process of Nakaoka requires overaging (i.e. the application of heat),which is expressly excluded from the present invention (*see* page 6, lines 27-39), and thus the steel of Nakaoka does not contain martensite because it is destroyed.

This can be seen from Table 2 of Nakaoka, which shows that the tensile strengths are between 360 and 480 MPa compared to the values obtained for Examples for the present invention, which ranges from 650 to 720 MPa (*see* page 9 of the specification). Such a difference in tensile strengths shows that the steels of Nakaoka do not contain martensite at

the end of the process.

Thus, Nakaoka fails to disclose the claimed amount of chromium and martensite.

The Examiner relies on Chatfield as disclosing a dual-phase steel strip containing 0.1-0.7 wt% Cr. It is the Examiner's position that it would have been obvious to one of ordinary skill in the art to add 0.1-0.7 wt% of Cr into the slab of Nakaoka in order to increase hardenability at a cost factor significantly lower than that found in a steel having an increased manganese content. *See* col. 2, lines 8-16 of Chatfield.

Appellant respectfully disagrees.

First, the chemical compositions of Nakaoka and Chatfield are different. That is, Chatfield discloses a steel composition comprising higher amounts of C, Mn and Si compared to Nakaoka's composition.

In addition, Nakaoka discloses several objects among which the increasing of the Lankford value of the steel. *See* col. 4. In this same column, Nakaoka discloses more details on how to achieve such a goal, particularly at lines 43 to 46, Nakaoka discloses "reducing the content of substitutional solid solution, particularly that of manganese". This is why the manganese amount of Nakaoka is limited to 0.25%. Chatfield discloses 1.25 to 1.8% of manganese, which is at least 5 times more than in Nakaoka. The amount of manganese in Chatfield completely changes the nature of the steel. Further, the manganese amount in Chatfield is considered to be a reduced one, as the addition of chromium does not allow adding more manganese to get the required tensile strength.

Since the steels of Nakaoka and Chatfield are different, the desired properties would be different, and it would not have been obvious to combine the two references.

Second, the steels and process of obtaining the steels of Nakaoka and Chatfield are different. Nakaoka's steel is cold-rolled whereas Chatfield's steel is hot-rolled. In addition, Nakaoka seeks to reduce tensile strength whereas Chatfield seeks to increase tensile strength. Thus, the process of Nakaoka and Chatfield are not substantially identical.

Third, the final microstructure of the steels are different. Nakaoka's steel contains only ferrite whereas Chatfield's steel contains ferrite and martensite. This can be seen from the differences in tensile strength. For example, the steels of Nakaoka exhibit tensile strengths of 360 and 480 MPa whereas the steels of Chatfield exhibit tensile strengths of 633 and 651 MPa.

Thus, in view of the differences between Nakaoka and Chatfield, one of ordinary skill in the art would not look to Chatfield to modify the composition of Nakaoka by adding 0.1-0.7 wt % of Cr, and would not arrive at the claimed invention.

Moreover, one of ordinary skill in the art would not combine Nakaoka and Chatfield since Nakaoka expressly seeks a steel with reduced tensile strength, which is contrary to the object of Chatfield. In other words, Nakaoka teaches away from being combined with Chatfield.

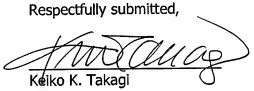
For at least the above reasons, it is respectfully submitted that there is no motivation to combine Nakaoka with Chatfield, and thus, a *prima facie* case of obviousness has not been established.

Additionally, the claimed invention provides a ferritic/martensitic structure with a low-alloyed steel which unexpectedly provides both a high tensile strength and a good drawing behavior. Such superior effects could not be expected nor derived from Nakaoka and Chatfield, and the combination of Nakaoka and Chatfield do not result in the claimed invention, for the reasons discussed above.

In view of the above, Appellant respectfully submits that a *prima facie* case of obviousness has not been established and requests that the obviousness rejection based on Nakaoka and Chatfield be reversed.

The USPTO is directed and authorized to charge the statutory fee (37 C.F.R. §41.37(a) and 1.17(c)) and all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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CLAIMS APPENDIX

CLAIMS 1-12 ON APPEAL:

1. A process for producing a cold-rolled ferritic/martensitic dual-phase steel strip, wherein a slab, the chemical composition of which comprises, by weight:

$0.010\% \leq C \leq 100\%$

$0.050\% \leq Mn \leq 1.0\%$

$0.010\% \leq Cr \leq 1.0\%$

$0.010\% \leq Si \leq 0.50\%$

$0.001\% \leq P \leq 0.20\%$

$0.010\% \leq Al \leq 0.10\%$

$N \leq 0.010\%$

the balance being iron and impurities resulting from the smelting, is hot rolled, said process then comprising:

- coiling the hot-rolled strip obtained at a temperature of between 550 and 850°C; then
- cold rolling the strip with a reduction ratio of between 60 and 90%; then
- annealing the strip continuously in the intercritical range; and
- cooling it down to the ambient temperature in one or more steps, the cooling rate between 600°C and the ambient temperature being between 100°C/s and 1500°C/s; and
- optionally tempering it at a temperature less than 250°C,

the annealing and cooling operations being carried out in such a way that the strip finally contains from 1 to 15% martensite.

2. The process as claimed in claim 1, wherein the chemical composition of the steel comprises:

$0.020\% \leq C \leq 0.060\%$

$0.300\% \leq Mn \leq 0.500\%$

$0.010\% \leq Cr \leq 1.0\%$

$0.010\% \leq Si \leq 0.50\%$

$0.010\% \leq P \leq 0.100\%$

$0.010\% \leq Al \leq 0.10\%$

$N \leq 0.010\%$

the balance being iron and impurities resulting from the smelting.

3. The process as claimed in claim 1, wherein the strip is hot rolled at a temperature above 850°C.

4. The process as claimed in claim 1, wherein the strip is hot rolled at a temperature of between 550 and 750°C.

5. The process as claimed in claim 1, wherein the strip is cold rolled with a reduction ratio of between 70 and 80%.

6. The process as claimed in claim 1, wherein the continuous annealing of the cold-rolled strip comprises a temperature rise phase followed by a soak phase at a predetermined temperature.

7. The process as claimed in claim 6, wherein the soak temperature is between Ac_1 and 900°C.

8. The process as claimed in claim 7, wherein the soak temperature is between 750 and 850°C.

9. The process as claimed in claim 1, wherein the cooling down to the ambient temperature comprises a first, slow cooling step between the soak temperature and 600°C, during which the cooling rate is less than 50°C/s, followed by a second cooling step at a higher rate, of between 100°C/s and 1500°C/s, down to the ambient temperature.

10. The process as claimed in claim 9, wherein the second cooling step is carried out by water quenching.

11. The process as claimed in claim 1, wherein the cooling is carried out in a single operation at a cooling rate of between 100°C/s and 1500°C/s.

12. The process as claimed in claim 11, wherein the cooling is carried out by water quenching.

EVIDENCE APPENDIX:

Pursuant to 37 C.F.R. § 41.37(c)(1)(ix), submitted herewith are copies of any evidence submitted pursuant to 37 C.F.R. §§ 1.130, 1.131, or 1.132 or any other evidence entered by the Examiner and relied upon by Appellant in the appeal.

None.

RELATED PROCEEDINGS APPENDIX

Submitted herewith are copies of decisions rendered by a court or the Board in any proceeding identified about in Section II pursuant to 37 C.F.R. § 41.37(c)(1)(ii).

None.